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ABSTRACT

Drawn from a conference that addressed the problems and challenges facing technical communication educators, the papers in this collection deal in general with career opportunities and educational programs in technical communication. Specifically, the papers discuss the following topics: (1) internship programs and job interviews at Rensselaer Polytechnic Institute; (2) the internship program at Iowa State University; (3) three programs in communication at Rensselaer; (4) the technical writing degree offered by Carnegie-Mellon University, with emphasis on its scientific components; (5) science communication at Boston University; (6) innovations in the Michigan Tech technical writing program; (7) technical journalism at Colorado State University; and (8) the need for research in the area of communication in scientific and technical settings. (FL)

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CONFERENCE OF DIRECTORS OF TECHNICAL COMMUNICATION PROGRAMS

PROCEEDINGS

March 21-23, 1974

University of Minnesota

Saint Paul, Minnesota

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Thomas E. Pearsall
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Eugene S. Wright--University of Minnesota

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*Chairman

INTRODUCTORY SUMMARY

Thomas E. Pearsall
University of Minnesota

Perhaps the best way to introduce these proceedings is to reproduce the letter that the Department of Rhetoric at the University of Minnesota sent to 20 directors of technical communication programs in the United states. The body of the letter read

> Some 20 programs in Technical Communication (variously named) now exist in the United States. In age our programs range from 1 to 17 years old. Some are graduate programs; most are undergraduate programs located at 2- and 4-year colleges and universities. (I've attached a list of schools.)*
>
> We share a number of problems and challenges: What elements make up a successful TC program? What balance do we need between specialized and generalized training? How much science and technology does a technical communicator need and what kind? What are the job opportunities for our graduates and where are they located? How well do our graduates measure up to the standards of working professionals?
>
> Perhaps, we would find it worthwhile to sit down together and discuss the answers to these questions and others. What I am therefore proposing is a meeting of the heads of the technical communication programs. We at Minnesota would like to host such a meeting during the winter or spring of 1974.
>
> Would you be interested? Let us know. If you like the idea of a meeting, suggest some agenda items to us. If we get enough positive response, we'll plan the meeting and get back to you with a program. Also, we'll contact the Society of Technical Communication to see if they would like to be represented by one or more of their national officers.
>
> Please write whether you favor this idea or not. We'd like to know either way.

As the letter shows, the major purpose of the proposed meeting was the exchange of information. Fourteen schools responded favorably to the letter and nine program directors or their representatives traveled to

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*See Appendix 1

Minnesota for the meeting that was held on March 21-23, 1974. In addition nine professors from the University of Minnesota and two members of the Twin Cities Chapter of the Society of Technical Communication attended.

Some of the attendees gave informal talks that served as the basis for discussion. The talks form the body of these Proceedings. What immediately follows is a summary of some of the major points discussed.

Career Opportunities

Everyone reported quite positively about job placement. Job opportunities were reported to be readily available for qualified graduates. Several schools stated that more jobs were available than there were graduates to fill them. Students were being placed in industry, government, and journalism.

Technical Communication departments worked through college placement offices when they could, but most seemed to feel a deep responsibility to lend a hand in the placement process. Most trained their students for the job hunt--in such matters as interviewing, plant visits, and the preparation of letters of application, resumes, and dossiers. Many TC professors used their consulting opportunities as a means of gathering contacts for student employment.

Everyone agreed with Wayne Losano's statement that placement was not a sometime thing but needed to be pursued year round. He reported keeping a folder of job ads clipped weekly from the New York Times. Not only did these ads contain immediate opportunities, they contained names and addresses for future contacts. Keeping current with the job market not only helps in placement; it also helps program directors to keep the

content of their programs responsive to industrial needs and trends.

Internship programs, to be discussed next, also provided job opportunities. Many firms are pleased enough with interns to employ them full time after graduation. Also the internship programs provide fruitful contacts and provide another method of making potential employers aware of the TC programs.

Internship Programs

Most of the schools present had an internship program of some sort to provide students with on-the-job experience. The programs take various forms.

Boston University, in addition to placing students in part-time jobs, operates a "Science in New England" news service that distributes free, student-written news releases and short articles about science and technology to daily newspapers throughout New England. B.U. students have also arranged "How to Write for Publication" seminars that not only provide student experience in running such programs, but that also raise money for "Science in New England" and other student projects.

Iowa State University has a two-stage internship program. The first stage comes during the student's sophomore or junior year and consists of writing and editing jobs for the campus newspaper, extension services, agricultural information, college newsletters, and so forth. This early internship seems justified on two counts--it provides students with practical experience, and in some cases it convinces them that this type of work is not for them. The second stage is usually full-time employment in the summer between the student's junior and senior year. Both internships receive credit.

Carnegie-Mellon University's internship calls for 100 hours of work in business and industry during the junior or senior year.

RPI has a 4-1-4 semester system that leaves January free for independent study and special projects. Most of their internships occur during this period. RPI sees the internship not only as a time to gain on-the-job experience but as an opportunity for a dress rehearsal of the future job hunt for full-time employment.

Minnesota's internship occurs usually during the student's senior year. The student works 10-20 hours a week for one 10-week quarter. A three-way contract is written clearly spelling out the responsibilities of the student, the employer, and the faculty adviser. In all cases, the employer is asked to provide an evaluation of the student's work. Credit is given.

The internship opportunities seemed to be best for those schools near metropolitan areas, but many internship opportunities exist within the bounds of the universities. Many departments are glad to have interns to help them prepare papers for publication, to edit news releases, and so forth.

Michigan Tech supplements its students' experience with trips to the Twin Cities for tours through publishing plants and advertising agencies.

Most program directors felt that students doing useful work deserved to be paid. But all agreed that, for the most part, the student gained more than the employer, and that pay was secondary to experience.

Pay for students is sometimes a problem because company pension and health plans make the payment of part-time help administratively difficult. One suggested way around this problem was the company's making a grant to the university which in turn pays the student.

The Elements of a Successful Technical Communication Program

Both undergraduate and graduate programs were represented and discussed at the meeting. Because some significant differences exist between these two types of programs, they will be discussed separately.

Undergraduate Programs

Although all undergraduate programs are housed in communication, journalism, or language and literature departments, they are all highly interdisciplinary. Program directors recognize that the home departments can in no way provide all the education required by future technical communicators. There needs to be heavy involvement with other university departments, particularly those in mathematics and science.

All the programs require from 25-40% of the students' programs to be in science and technology. In most cases, only about 30% of the program is taken up with the communication core. What goes into the core varies with the emphases of the home department. In some schools the emphasis is heavy on journalism, in others English and literature. Other schools emphasize communication theory such as communication strategies, interpersonal communication, transfer of technology, and so forth. Regardless of the emphasis, all recognize the need to develop writing skills as a major part of the core. Most also place an emphasis, directly or indirectly, on speaking and listening skills.

The undergraduate programs at Carnegie-Mellon, RPI, and Minnesota provide examples of these general statements. The Carnegie-Mellon program requires 4 courses in literature, plus 4 courses in writing and editing, one of which is a 100-hour internship. Supplementing the University's requirements in history and social science, the student takes 10 additional courses in science and social science. Two semesters of work are required with the University's Department of Design.

An undergraduate program is just getting underway at RPI. Beyond a core of 6-9 hours in communication theory, there will be a series of options in technical communication with reinforcement from courses in management and psychology. Some options will include the various arts of communication that take place in the fine arts. Some though is being given to an option in scientific journalism. All RPI undergraduates take 6-8 courses in mathematics and science. Technical communication majors will build additional courses on to these.

Minnesota's program is built around a 60-hour core in communication which stresses competency in six areas: writing-editing; communication theory and research; oral communication; audio-visual and media presentation; graphic communication; and organizational, managerial, and training communication. In addition to this communication core, students meet the normal university requirements of 16 hours of writing and speech courses and 20 hours of artistic expression. Surrounding the communication requirements, the students take 88 hours of mathematics and physical, biological, and social sciences. In addition the student has 25 hours of free electives.

Graduate Programs

In graduate programs the emphasis is on teaching communication skills and not on communication skills plus a general education, as in undergraduate programs. In many cases, the students come to these graduate programs with an undergraduate major in science or technology. The masters' programs at RPI and B.U. serve as examples.

The RPI program includes courses in theory of communication, writing and editing, communication strategies, mass communication, organizational communication, advertising strategies, personnel management, management in society, and problems in American society. The last four are not offered by the home department but by RPI's School of Management.

B.U. offers required courses in techniques of journalistic writing, theory and process of communication, science news writing, science in New England, technology assessment, and audio-visual presentation. Elective courses may be chosen from history of science for science writers; philosophy of science for science writers; directed studies in science features for film and television; magazine and newsletter editing, layout, and design; readership surveys; and publications management projects. Students may also elect courses in broadcasting, film journalism, and public relations departments as well as graduate courses in biology, chemistry, physics, math and engineering offered in other schools of the University. B.U.'s program, in addition to its internship program, attempts to tie practical experience in with many of its courses.

Needed Research

Much research needs to be done in technical communication. For example, no real research has been done in measuring the professional

skills of graduates. There has been graduate feedback, mostly favorable, but no one or no organization has done the job systematically.

Beyond such "reactive" research, much could be done to investigate the phenomena of communication in scientific and technical settings to answer the many questions that need to be solved for the transfer of technology to occur. One research paradigm suggested was

--What are the objectives of this communication event?

--What answers can be found through pre-audience analysis?

--What alternatives are there for message design?

--What alternatives are there for media and channel selection?

--How can the results of communication be measured?

--What are the results of communication?

--How can messages, media, and channels be changed to meet objectives?

Most agreed that if technical communication was going to be dynamic rather than static, if technical communicators were going to be not only writers but men and women who understood and appreciated all the processes of communication, that more research needed to be done in the field.

Future Meetings

The directors agreed that the meeting provided a valuable exchange of information, so much so, that future meetings--at least yearly--were desired. Tentatively, a meeting has been scheduled for the fall of 1974 at Boston University.

INTERNSHIP PROGRAMS AND JOB INTERVIEWS AT R.P.I.

Wayne Losano
Rensselaer Polytechnic Institute

Although my title may indicate a balanced presentation, directed both to descriptions of internships and placement activities, my emphasis will be heavily on placement techniques, since this seems the most crucial area in any technical communication program. Actually, the close procedural parallel between arranging for internships in technical communication and actually placing graduates in tech comm positions makes it easier to handle both topics in one presentation. It is, in fact, quite possible and certainly useful to treat internship arrangements as "practice" for later job placement activities, just as we now treat internships themselves as practice for later job experience. Our students need some taste of job-securing tactics, and we can always use practice smoothing out our placement techniques and adjusting our techniques to individual students and the internship arrangements can serve both needs admirably.

Internships

RPI's internships in tech comm are recent outgrowths of the school's new 4-1-4 semester plan which frees January for special activities. The internship program, as limited as it is because of time constraints, seems an ideal January term activity for our tech writing students, and student reports indicate that the experience is worthwhile. Although our program is briefer than some offered in other tech comm programs, it does fulfill the primary function of all internships, that of giving

students a chance to experience not so much particular jobs but the environment in which they ultimately will have to survive. We would rather have our tech comm students get a general taste of the varied duties they may be called upon to perform in industry or publications than have them spend a full month gaining experience in a very limited specialization, although the needs of industry often demand that students do specialize during their internships. An IBM interviewer specifically urged that students not be sent out into industry without first having had some experience with the chaos they might well encounter. This experience, he suggested, could be obtained both through internships such as ours and through several courses in the school of management, courses such as "Problems in American Industry."

Properly selected internships should not only acquaint students with the industrial environment but should also provide them with an opportunity to apply some of the practical techniques they have learned in various courses to real situations. In this way the students will be able to assess their training in tech comm, to determine their own strengths and weaknesses (as well as ours), and to plan to eliminate their most noticeable weaknesses. At the same time, internships should help us to strengthen our tech comm programs by making them more responsive to the needs of industry. If we find, for example, that our students need graphics knowledge in order to function well, we should adjust our program to answer this need, perhaps by bringing in an outside lecturer to run a mini-course in graphics. Having the internships in the middle of the school year, as we do, allows us to adjust individual student programs and portions of our entire program to suit the present needs of industry.

Placement Techniques

Internship Arrangements. Arranging for student internships in tech comm is merely a simplified version of actual job placement techniques. All of us have some industry contacts, gained either through consulting or personal acquaintance, and these contacts are usually sufficient to provide enough internships for students in modest-sized tech comm programs. Thus, most of our internship placement arrangements are made informally, through telephone calls to people we know. It is usually quite simple to interest someone in industry in taking a student in tech writing, since such a student can usually be seen as being of some immediate use. Low-priority or time-consuming comm projects for which time or money or personnel are not available may be perfect for student interns, and even projects of preternatural dullness may, unfortunately, not be intolerable to the students who are accustomed to regular classroom work. Arrangement procedures consist simply of explaining the purpose of the internship program to the prospective employer, detailing the sorts of students we have available and the sorts of projects they may be suited for, and convincing our industrial contact of the benefits of participating in the program. We must not, however, oversell the students' abilities and the contribution they can make to a company; it is, after all, the student who will benefit the most and not the industry.

Although the arrangements for internships are not especially elaborate, it is perhaps best that the students see the arrangement procedure as much more formal than it actually is. We usually try to arrange actual interviews and to send a couple of students to be interviewed for each

possible internship, even if we have already determined which student would be suitable for the position. This procedure allows the employer some measure of choice and gives the students some sense of the competitive realities of the interview procedure. During the course of the internship we also try to monitor the student's progress, again emphasising the importance of the experience and helping us to get a more accurate assessment of the student's potential abilities for later job placement. Of course, students who perform with near brilliance in their internships may well secure for themselves later employment in the same company.

Job Placement. We can approach the placement of our graduates in tech comm from several avenues, all of which are worth pursuing at least to some degree.

College Placement Offices. It would be ideal if we could assume that all job placement would be done by the placement service of the university. Unfortunately, it often appears that placement offices are not really set up to handle tech writers. R.P.I.'s placement office for example, is exclusively geared to handle engineering, science, and management graduates and seems quite uncomfortable with tech comm grads.

On the other hand, those of us responsible for placing grads of tech comm programs can easily work in cooperation with the placement office in several ways. We must, first of all, make certain that the people in the placement office know exactly the kind of students we have available, so that they can suggest our program and its graduates if an occasion arises. We should also arrange for copies of any requests from industry for communication specialists be sent to us so that, if necessary,

we can quickly provide our students with such information. A third, and potentially very fruitful, way in which those of us in tech comm can work with college placement offices is by making use of the innumerable on-campus interviews scheduled each winter and spring. Companies indicate their particular employee needs--EE's, ME's, etc.--and this information plus the date of their campus visit is published. Many of these interviewers have the time to interview one or two tech comm students, are often receptive to the idea, and may well find that indeed their companies do have need for a tech writer.

General Letter. With the increasing difficulty of placing students in jobs in certain academic areas, some college departments have taken to sending out mailings describing their graduates in glowing terms and overtly selling their product. This approach seems a bit extreme, although a modification of it, a yearly letter to various industries and publishing companies, reminding them of the existence of our tech comm programs, seems acceptable. We should be wary of becoming too "pushy" in our eagerness to place all of our students. It should be enough to make a good program familiar to potential employers so they will seek out our students.

Job Advertisements. Job placement is not something that we do one month a year, in the spring, and forget about for the remaining months. If we actually take seriously our responsibility for placing our tech comm graduates we should keep up with job openings and industry trends throughout the school year and even during the summer. Each week I cut out appropriate advertisements from the Sunday classified sections of

several newspapers which I then can use in several ways. First of all, having the job descriptions available during advising sessions helps me to show students exactly what the current needs of industry are and thus we are able to structure the student's program to meet these industry needs. These ads are also, of course, another means of keeping our programs responsive to industrial needs and trends.

Ads for technical communicators also help us, as department placement officers, to contact the right companies and the right individuals in those companies, and to tell them of the existence of our program and suggest that they consider our students to fill their needs in tech communication. Finally, of course, we can give certain ads to likely students and suggest that they pursue an attractive job possibility.

Resumes and Dossiers. We should, naturally, expect our students to play a substantial role in job hunting, and a good deal of the job-finding responsibility should be placed on the students. To help our students compete favorably, we should spend some time helping them with their resumes and selecting suitable materials to submit as their dossier. Reviewing resumes and covering letters prepared by students who have followed some reasonable general format does not take an inordinate amount of time, and the return on the time spent is often quite good. If necessary, a brief, informal seminar on interview and plant visit techniques may also be helpful.

Professional Contacts. As is true with internships, our contacts with people in industry are often a good means of finding jobs for our tech comm students. Whenever possible, we should keep such contacts

informed of the people we are currently graduating, and we should seek out any present or projected openings which may exist.

With our crowded schedules, we often have too little time to spend serving as placement officers, even for a limited number of graduates. It is crucial, therefore, that we develop as thorough and as efficient an approach to placement as we can, so that we might make the most of whatever time we do have available.

INTERNSHIP PROGRAMS AT IOWA STATE UNIVERSITY

Jerome Nelson
Iowa State University

Before I go to our internship program, I think a word or two about the general philosophy of the department is appropriate. We were named for a long time the Department of Technical Journalism and spent several years trying to rid ourselves of that adjective. Despite the name, the philosophy has been that we would offer no specialized courses, such as ag. journalism or home ec. journalism or science journalism. Coupled with this idea of no special courses, of course, is the notion that the student is going to come to us with some interests other than those journalistic. He's going to come to us, perhaps, with an interest in agriculture, in animal science, or whatever--in one or the other of the sciences--and many of them do. I mentioned earlier on today a girl who's working for Honeywell. She came to us to get a journalism degree, but she had a strong interest in computer science. She ended up getting a double major, and it took her no longer in the long haul to get her degree.

Every faculty member in the department acts as an advisor. We don't have a single advisor as they do in some programs. Every advisor constantly tries to steer the student toward experiences in an area that the student specifies. For example, if they're interested in chemistry, advisors strongly suggest that they go over and talk to an advisor in that department to see if a second major might not be arranged. Or they suggest chemistry courses.

On top of that, we have developed a two-stage undergraduate internship program that is required of all journalism students. Both courses in this program are offered on a pass-not pass basis for academic credit (that's 6 academic credits). In some lucky situations, under the first course, they'll also get some pay. But in any event, they do get academic credit.

Okay, what's the first one? It's an internship course that follows hard on the heels of the introductory course in journalism and two 4-credit courses in reporting, writing and editing. In the course, the students work very closely with an academic person involved--that would be a professor, perhaps of news writing--and also with a professional in the field. They are asked to get their own jobs if they can. If they can't, we try to help them. But I think the point here is that they're very closely supervised by both academic and professional people. They spend a minimum of 8 hours a week over a quarter of 10-11 weeks working on the job. They contract for what they're going to do. I can give you a pretty general example: Some, I would say, probably 15-20% of our students, end up working for the campus daily to satisfy this commitment. They'll contract for what they're going to do on the daily in very specific fashion. For example, they'll say "I'm going to write at least 500 words a week that are going to show up in published stories over the course of the quarter." Now they either fulfill the contract or they don't, and if, at the end of the quarter they don't have 500 words times 10, they fail. In some cases the students themselves will say, "I'm not getting the kind of professional experience in this job that I would like

to get; therefore, I'm going to bow out." We've had several do this; they'll take the "F" for that quarter and then try to set up a better experience in a subsequent quarter. We think this is good. It suggest to us that they're building up some sort of discriminators, that they're able to judge the kind of instruction and help they're getting on the job, and they get better pay-off usually the second go-around. As a matter of fact, I don't know of anyone who has opted to fail the second time out. In addition to the work, they meet 3 out of 4 weeks in small groups to discuss common problems with students who hold similar jobs. That is, persons working in Extension, for example, come together and discuss the problems they are confronting in these extension jobs. Students who are working for local media, like the newspaper and the daily and some of these surrounding papers, will come together and discuss what's happening. They also meet one out of 4 weeks in large-group sessions, and visiting firemen come in and talk about what's going on in the trade. Sometimes these large-group efforts don't have much pay-off, but, at any rate, there's some common learning we hope will take place in these sessions.

As far as science and technology, what sort of experiences do they get? We've got the following that are somewhat formalized now: We have an "in" at the Atomic Energy Commission, Ames Laboratory where a student will write and edit the internal newspaper under the supervision of a professional journalist over there. In many instances on this job, they'll help this pro translate scientific reports into materials for the mass media. We have another job at the Engineering Research Institute; the editor there is one of our graduates, which helps, and he has opened a spot over there.

There they assist in the preparation of journal articles, as well as helping with the editing and writing of the Institute's publication. The Assistant Dean of Sciences and Humanities has a bulletin newsletter for biologists; one of our students, usually one who's either in biology or zoology or botany picks this job up. Agricultural Information--we get a lot in there. The Center for Agriculture and Rural Development is another place where we send our students. All of the extensions--home economics extension and so on--take interns. We have a new one at Red Oak Learning Center, which is a Department of Public Instruction operation for the state, where they are preparing learning packages for students on the elementary and secondary school level. So students get a different type of experience there; it's more of a public relations experience. We feel that some of the advantages of this first stage are that they do in fact get early experiences in the kinds of jobs they might hold later on; in several instances it suggested to people in our program that they didn't want to be in our program, and we think this is good. There's no point in investing 4 years and getting out and discover you hate what you're doing. Several other persons have come over to us and been sort of turned off by the first 3 courses, then they get into this and fall in love with the profession. Which gets to the second advantage we think exists in this internship program, and that is that it does stimulate a very professional attitude. We've very happy with it in that respect. This experience takes place, incidentally, at the end of the sophomore or the beginning of the junior year.

We follow this with a course that students ususally take either in the summer between their junior and senior years or sometime in the

senior year. It's required and is the equivalent of three months full-time work on some publication, in some broadcast operation, some sort of public relations operation, this kind of thing. There's not direct academic supervision here; the student is simply employed, for example, by the newspaper in the same way he'd be employed if her were going out and applying for a job. In other words, the professional evaluates the performance at this stage. Most of these internships occur in the summertime, and we've lined up a lot of them with newspapers in the state. We have one that occurs every quarter with the Waterloo Courier. They've had good luck with their interns and like the program. We have, every quarter, a public relations internship with Dupont, which is strictly science and technological. At any rate, what happens here is entirely up to the student. And here again we urge them, if they feel they're not getting the kind of training they would like to get to bow out, to quit. Some of them have, I believe, but not too many because there's a substantially greater investment in this second course than there is in the first one.

There was in the beginning, when we thought about doing this, a great deal of worry both on the part of the faculty and on the part of the students that there wouldn't be jobs available for interns. That just hasn't proved to be the case at all; everybody finds a job and with relative ease. Now we do take up some of the slack with the campus publications. In our building we publish the Iowa State Daily and 3 magazines. We also have a couple elsewhere on campus. So we do have those things that students can plug into if they absolutely can't find anything to do on the outside.

After 6 years of operating this thing on a step-by-step basis, our feedback has been uniformly good. From students--they like it--now this is after they've done it--beforehand they don't like it. As a matter of fact, we lost a really good student who just absolutely refused to engage in it; they think this is the worst thing that could possibly happen to them, but afterward, after they've been out and done it, the feedback becomes very good. From the professionals--if they get a person who does the job, the feedback has been very good, but they're very happy to tell us when the students don't do the job too. Generally speaking, however, I think the reaction to the program on the part of the media of the state--talking about the nuts-and-bolts journalists and the people who are in science and technical writing--has been good.

How do we measure the sucess of this stuff? One is through feedback of this kind--do the kids like it? Do the pros like it? Another is the kind of salaries that these people command at the end, and some of them are staggering, at least when I think about them. I'm tempted to write and say, "Never mind the kid, I'll take the job!" All in all, I'd say that our experience has been very good.

I meant to say earlier on, one of the things we expect in the first course is a completed string book or some sort of package of physical material that they can carry into an interview and say, "Look what I've done!" We don't, incidentally, edit this; we have them tell it like it is, "This is what I wrote for the publication I worked for." They've done demo tapes, this kind of thing, and we expect them to have that at the end of the quarter. A colleague and I hired one of these kids to produce some

educational materials for us, and he did a 20-minute video-tape tour through a composing room. We're teaching a course where we want to show people what a composing room looks like. We tried taking them through physically, and it didn't work, so we thought we'd get a TV tape, walk them through that way and then take them down and walk them through the plant. Okay, the kid made it for us, and what he had to do, under supervision, was write the script, go down and spend all that frustrating time shooting with a porta-pack TV camera, and the whole bit. He did a good job for us; we're very pleased with it. We had a contract with another student to do some stuff on the history of printing--the same course. He took approximately 150 slides for us and wrote an audio presentation of about 45 minutes to go along with those slides. He spent an inordinate amount of time on it and did a very good job.

THE THREE PROGRAMS IN COMMUNICATION AT RPI

Robert W. Elmer
Rensselaer Polytechnic Institute

Let me talk first about our master's program in technical writing since these remarks will follow some of the things Wayne has said. It's a 30-hour program. It's been in existence for about 18 years now; it is a product of that interest of ours which began with the Technical Writers' Institute founded by Jay Gould many years ago. We have 14 or 15 students in the program each year. Half of these have had their undergraduate training in engineering or science, the other half in the liberal arts. We prefer candidates who have an engineering or science degree, but we can place all our candidates.

The program has a required 6-credit course in theory of communication (the same course taken by the PhD students, but there are different requirements at the two levels). Then there is a series of four courses taken by all students: Writing and Editing in the fall, followed in the spring by Writing for Publication; a fall course Forms of Technical Writing, followed in the spring by Writing for Industry. These courses, totalling 18 credits, make up the basic program. The remaining courses, totalling 12 credits, may include Communication Strategies, Mass Communication in Mass Society, Organizational Communication, Advertising Strategies, Personnel Management, Management in Society, and Problems in American Society. These last four are offered by the School of Management, and we encourage our students to register for them since their careers may very well take them into publications management. These courses prepare them for the larger organizational view they will need. We encourage our

students also to take courses in psychology--for example, Group Dynamics or Motivation. In short, what we believe we give our students in their one year with us is that training which will be useful to them when they are out practicing their profession.

Let me turn now to our PhD program. We have graduated about 6 so far and have about 30 more at the candidacy or dissertation stage. We began in 1966/67, and of course it takes a while for the first persons to get through. It began officially as a PhD in Communication and Rhetoric, but the Rhetoric is now being excised from the title because we now accept a very broad content for the term "Communication." Our students have come, for the most part, with a master's degree in English or education, but not all; in fact there is an increasing number who have quite different backgrounds.

The program consists of a core of courses which all students take plus a body of courses determined by the special career interests of the student. The core includes 6 credits in communication theory, 3 in theory construction, and 6 in a course which develops the broad cultural context of specific types and specimens of language use (an outgrowth of our work in American Studies). There are then three ways a student can go. If he wishes to stay in communication, he takes 3 more credits in theory, 6 credits in communication research, and then fills his program according to his interests. The second track is an attempt to marry the study of communication with traditional study in literature. The student pursues both, side by side, with a view of offering himself on the job market as one who can teach both; or he tries to bring about a synthesis. This year for the first time we have two students who in their dissertations will try to effect this synthesis; both have a very

good background in literature and also training in communication. Some of the other courses in the second option include one in literary theory, a course as yet unnamed which will try to draw the parallels between literature and communication, and various advanced seminars in modern rhetoric and literature. The third possibility for the PhD student is to work out an interdisciplinary program fitting his special needs, using our core courses and then picking up courses all over the university. For instance, a person could have a strong concentration on the graduate level in psychology, or in the problems of management as these are affected by communication, or he could be like two of our students who are already in public-school education and wish to work out a research problem which would be of value to them.

A new feature of our program is an after-four-o'clock, two-year schedule which will make it possible for persons to remain employed and also complete their course and residence requirements for the degree. We will try it for a few years to see if it does draw such persons into the program. We now have about 7 or 8 new students every year. We would like to double this number.

The program I have been describing may not seem to have much connection with technical communication, but it seems to me that a person with a PhD of this type would have a strong training for certain kinds of positions in industry and certainly in the academic training of technical writers.

Almost all graduate students get some help through partial tuition scholarships; the amount is determined by the GAPFSAS formula which our admissions office accepts. On the PhD level there are also teaching assistantships. We have 5 assigned to us. And by the way, these

assistants really supplement our staff. If they have had experience in technical writing, they will be asked to teach a section of that in our undergraduate program. Or they may have had experience teaching literature or composition; if so, they would be assigned there. The usual teaching load is one section per semester plus other duties. The stipend is $2500 for the two semesters and 24 hours of tuition credit (tuition remission). Many of our students, especially in the master's program, are also doing part-time editorial work on campus--this is something Wayne Losano has worked cut. For their writing projects they are paid $3.00 an hour; and there are local industries that will take part-time technical writers.

Our undergraduate program in communication is just getting under way. We have perhaps 6 or 8 majors. We have been rethinking the program and now believe that it will follow the pattern of the master's and PhD programs; that is, there will be 6-9 credits in those aspects of the theory of communication which are suitable for an understanding of a great range of communication activities. There would then be a series of options--for example, one in technical communication, with re-inforcement from courses in management or psychology or some other area. There would also be an option in the various arts of communication which would take advantage of courses in the fine arts. There could be a concentration in literature or drama or music, all based on a general theoretical understanding of communication processes.

We are also thinking of an undergraduate major in scientific journalism or science reporting. One of our colleagues, Dr. Jan Robbins, has a

journalism degree from Minnesota; Dr. Bob Krull, another colleague, has one from Wisconsin. They have been concerned with the need to develop a new kind of science reporter, more sophisticated than what seems to be current, namely, a person with training not only in communication, but also in the history of science, the nature of science as a human activity, and the history of mathematics. When such a person came to the reporting of particular scientific events, he could place them in a wider context than he would otherwise be able to do.

What I think we may be able to turn out, in the undergraduate program, is a person who really has an undergraduate professional degree, comparable to the professional degrees in engineering, let's say. After the completion of his program a student would be able to go out and work on a fairly advanced level. This person might then go on to a master's or PhD program, but he would have something which he could use right away. This undergraduate program is still in the thinking stage, though we'll try to begin work on it next year. Most of the courses we are speaking of already exist on campus, so there is not the need to create new courses. We need simply to reassemble or reintegrate those already existing.

Let me just add that the kind of undergraduate major we are speaking of should have a strong math-science background. We would have this in our program because one of the general requirements for an RPI bachelor's degree is 6 to 8 courses in math and science. Our majors would build on this.

A TECHNICAL WRITING AND EDITING DEGREE: WHAT SHOULD BE THE SCIENTIFIC COMPONENTS?

Beekman W. Cottrell
Carnegie-Mellon University

I don't know about the rest of you, but I've had three calls in as many weeks from as far away as New York and Connecticut in the hope that we would have graduating seniors available for jobs. And of course Carnegie-Mellon's location in industrial Pittsburgh means that there is a constant local demand for writers, editors, advertising copywriters and a whole range of other industry-related jobs. No one of our students who has seriously wanted a job has failed to get one for as far back as I can remember.

Well, let's assume, then, that we all want to lay out the shape of our particular degrees and to learn all we can about other programs. This time around it will be exchange of information for us all.

I'd like, in a brief space of time, to do two things: one, tell you about the history and background of our technical writing degree and, two, concentrate on the math and science components it contains. I have questioned some of our graduates and graduating seniors, and I think you'll find their responses enlightening.

I. It is important to say at the outset that in 1958, the year when our Technical Writing degree began, we were not Carnegie-Mellon University but Carnegie Institute of Technology. Thus, science and engineering dominated the campus, along with the unlikely combination of one of the best Fine Arts Colleges in the country, notable for its drama and music departments. At that time only the Margaret Morrison Carnegie College for women gave

degrees in English, and thus the Technical Writing majors were exclusively women until about eight years ago. In 1969 our College of Humanities and Social Sciences was established and now has some 500 students, men and women alike. The largest group are majors in English, with various options such as creative writing, technical writing, teacher training, and a straightforward literature major.

The technical writing group has always been small, with ten graduates a year on the average. It is a B. S. Degree, and thus only those students who can handle the science and math can qualify for it. At first, the majors were primarily transfers from the sciences--students who wished a broader education than a major in physics or chemical engineering could give them. But since the establishment of the liberal arts college we have begun to get incoming freshmen who immediately declare an interest in the technical writing degree. Our admission standards are high, so high verbal and math scores can be assumed for most students.

I may meet with argument here, but I believe that in 1958 Carnegie Tech was the first undergraduate school to offer a technical writing degree. There were a number of impetuses to establish such a degree at the Carnegie Institute of Technology:

1. a number of the English Department faculty at Carnegie were then working as writing consultants in such companies as Westinghouse and Pittsburgh Plate Glass. I myself for a number of years gave refresher courses in writing and editing to recently-hired young executives. This, as you know, is still going on and many graduating scientists still have not mastered the basic skills

of expository writing and capable editing. I'm sure all of us are still hard at work trying to help students develop these skills.

2. A second impetus was the demand from local industry for trained and knowledgeable writers and editors.
3. We at Carnegie had an ongoing interest in fresh approaches to the teaching of writing, and as a department of some 25 full-time members we continued to experiment with new techniques and approaches to composition. This was aided and abetted by the four C's stress in this area at that time.
4. The obvious strength of the sciences and mathematics on our campus was a fourth factor. We had built-in resources to tap for a B. S. in Technical Writing, and the scientists were all too ready to cooperate.

Considering all these factors, Professor Erwin R. Steinberg, now dean of the liberal arts college, set up the four-year program which has evolved into the degree as it looks today. It has quietly prospered, for we are not large enough to handle large numbers of students in the major. But, as I said earlier, entering freshmen are obviously seeing the degree as a practical one which unites a core of liberal arts studies with a large component of science and math. The students majoring in technical writing have fewer electives, but if they opt for the degree they understand its demands. And there are sufficient elective slots open to provide a relatively broad liberal education.

II. Here, then, is a quick summary of the degree.

There are college core requirements in literature, history and social

sciences. Four courses in literature include Shakespeare, a period course (English, American or World), an author seminar (English, American or World literature figures), and at least one free elective in English.

Paralleling these literature courses is a sequence of four writing courses:

Exposition I--practice in straightforward expository writing

Exposition II--practice in writing for special audiences, and a further refinement of writing techniques

Exposition III--the actual technical writing and editing course, taught usually by a professional from outside the university

Exposition IV--100 hours of actual internship in business and industry. Here we are lucky to be in Pittsburgh, and we have established cordial working relationships with Westinghouse, with the Graphic Arts Technical Foundation, and with advertising agencies. Our students get a real sense of the kinds of work they may be doing after graduation. Their internship supervisor provides evaluation and a grade.

III. And now to the science and math components. Let me state them and then try to make a case in their behalf.

2 courses in mathematics

2 courses in chemistry

2 courses in biology

2 courses in physics

2 courses in social science beyond the college core requirements

In addition--and with considerable success in recent years--we require two semesters of work with our design department. The students study principles and problems of design and layout, not the actual art of drawing or designing itself. In the last few years the students have found these courses especially valuable since the technical writing job opportunities have broadened in scope.

The theory behind this much exposure to the sciences and to math is that a student will graduate with at least a working vocabulary and some initial skills in a number of areas. Thus, if Koppers needs a technical writer our graduate will have some genuine knowledge of chemistry to put to use. Or if an advertising agency needs an employee, he will know something of the fundamentals of design and copywriting.

Support for the science/math component comes from two sources:

1. The technical writers in our area. Most of them have backed into their jobs because they could write and edit. But few of them had the background for the task. When I sketched out our degree to the local chpater of the Society for Technical Communication a year or so ago there were audible groans of envy. Most of these practicing technical writers were painfully under-prepared for their work.
2. Perhaps more relevant is the testimony of just-graduated and just-graduating majors.

To the question, "Theoretically, do you think that the present component of science and math is valid?" students responded:

"Yes, definitely."

"It would be preferable if the technical writer had a second option; that is, more courses in some field of interest." (I might add that the original plan incorporated this idea--that the student interested in chemistry or computer would explore that area in depth, and most of the majors today are doing that.)

"Yes, to the extent that a technical writer should be familiar with the basic concepts of science and math."

To the question, "Practically, how have you found it working out in terms of your overall program?" there were less clearcut answers. Warnings about physics and calculus and the overlap, worries about a second course which essentially added little that new to the first.

In short, the practical working-out of a theoretical plan always stumbles a bit.

To the question, "As you talk with others, does it seem to you that the various sciences and math will be of use to you in future jobs?" the answers are interestingly varied. Some students applying for jobs were impressive because of the wide background; some fewer felt it a slight handicap. The balance is on the side of diversity.

To the question, "Is there anything in the science/math component which you would add or subtract, based on your own experience?" every respondent commented on the need for a required basic computer science course. Jobs seem available in this area, and the knowledge of the computer language seems imperative now and for the future.

Scattered responses do not of course prove anything, but they do reveal trends. Given our campus and the skills it offers, the present pattern for the technical writing major seems valid. A computer science course or two seems highly recommended, and a bit more flexibility for the student who is clear about where he wishes to go in depth.

But it surely seems that a techical communication degree is presently a very valuable commodity indeed.

SCIENCE COMMUNICATION AT BOSTON UNIVERSITY

Harold Buchbinder
Boston University

The Boston University M.S. in Science Communication in our Department of Journalism is a pre-professional program that prepares its graduates to work in scientific fields as reporters, writers, editors, communication specialists or administrators, scientific liaison officers for technology assessment, public relations specialists, and managers for professional society seminars and university continuing education programs. The required courses of the program are Techniques of Journalisitic Writing, I & II; Theory and Process of Communication; Science News Writing Laboratory; Science in New England, I; Science, Technology and Public Policy, I & II; Technology Assessment; Audiovisual Presentations of Scientific and Technical Material, I. Elective courses are chosen from Science in New England, II; Transfer of Technology; Audiovisual Presentations of Scientific and Technical Material, II; Community and Corporate Information Expositions; Science Reporting for Radio; and Business Press Publishing Practices. The program consists of a minimum of 48 credits spread over three semesters plus a summer internship. In addition to the required and elective courses described the science communication division periodically offers special courses based on student interest. Courses offered in the past and available in the future are history of science for science writers; philosophy of science for science writers; directed studies in science features for film or television; magazine and newsletter editing, layout and design; readership surveys; and publications management projects. Students may also

elect courses in broadcasting, film, journalism and public relations departments as well as graduate courses in biology, chemistry, physics, math and engineering offered in other schools of the university.

We concentrate on attracting two types of students: (1) Those who have completed a B.S. or M.S. in science or engineering, have had a year or more of practical experience, recognize that they will only be technicians within their scientific or technical fields unless they go for a PhD, don't want to go for the PhD for any one of a number of subjective reasons, don't want to abandon the investment they've made, don't want to cop out and don't know what to do. If any of the positions described in our brochure appears attractive to them, we accept them into the program. (2) Those who have stumbled into some portion of the positions described in the front of the brochure recognize that to advance they need more formal training as professional science communicators, or need to increase their expertise in specific communication techniques within science or engineering technologies.

We spend at least--whenever possible--two to three hours with each student to assure ourselves that what we have to offer is of strong interest to them, that they do want to work in science communication, find this kind of work stimulating and gratifying--and are not in it or want to get in because they have no other choice.

Perhaps the single biggest factor in our training program centers around the fact that we attempt to correlate a good portion of our course work in school with practical experience. For example: (1) We sponsor a "Science in New England" news service that distributes news stories and articles about science and technology to daily newspapers throughout

New England. These articles are sent without fees to the newspapers provided they credit Science in New England and give a byline to the student. To raise money to fund the expenses and trips of sending students throughout New England, students run a seminar called "How to Write for Publication." This seminar brings together scientists and engineers throughout the country with the editors of nationally distributed publications headquartered in Boston. We normally aim for a profit of about $5,000 per seminar after all expenses. This sum of money permits each student to take two or three trips to cover conferences in science and technology that are of interest to them and that normally should be of interest to editors of newspapers throughout our six-state region. We cover only conferences or events in the New England states. This activity correlates with the courses that we call "Science in New England." Students are graded on their submitted releases and are paid on a per word basis. We pay from 5 to 10¢ so that payment also reflects the grade--a dual incentive.

(2) Because we cover all aspects of editing, writing, reporting for newspapers and magazines, our lectures include editorial writing, staff columns, feature articles, book reviews--everything normally written by reporters or editors of newspapers or magazines. Wherever possible we attempt to make arrangements with various publications so that the student works on an assignment that can appear over his or her name should they be able to meet the requirements of the editor for whom they write. To cover book reviews we obtain copies of recently or about to be published books so that our reviews can be as pertinent and as timely as any written and submitted for publication to those media in New England that use book reviews.

(3) Students interested in broadcast journalism prepare tapes suitable for broadcast on local stations within the New England area. We normally contact stations and arrange to prepare the kind of broadcasts they will accept. We have had about 48 five-minute "Science Spectrum" broadcasts aired over WCRB in Boston. Boston University's School of Publication has a radio station, but we prefer to test ourselves out in industry.

(4) Wherever possible we attempt to arrange for projects for museums, trade shows, science films or videotapes on science so that those students interested in audio-visual techniques will gain practical experience. Our students have made a film on a new surgical technique for removing skin cancer with Dr. Melvin Shoul; they have aired a 30-minute videotape on the "Light Fantastic" on channel 5 in Boston (a film introducing the lay public to application of lasers in medicine, machine tools, communications, computers, navigation and holography). Currently, five students are working on a film for GTE explaining to management men the benefits of utilizing computers in circuit design techniques.

(5) We place students with scientists to help them prepare their papers for publication in professional journals of their choice. The scientists reciprocate by assisting students to prepare articles on the scientists' work for publication in a newspaper or magazine read by the lay public. The aim is to increase the public's understanding of science in terms of what scientists do, why they do it and what's in it for all of us.

(6) Some of our students are full time employees in the public relations department, the publications department or the editorial department of newspapers, magazines or scientific concerns in the Boston area.

In addition to the required courses each student must take, we permit students to use special projects given to them by their supervisers at work for directed study credit. The net result must be filed in our records so that anyone in the department or any other student can observe and evaluate the work accomplished by the student under the heading of a "directed study." Our requirement is that everybody must be able to look at this work with respect. Samples of projects we have accepted as directed studies are: readership surveys across Computerworld newspaper, the supervision and organization of a manual on missile test and checkout system (declassified, of course), special technology assessment articles that appeared over the student's byline in publications such as Electromechanical Design, Digital Design, Circuits Manufacturing, Computerworld, Design News, Boston Globe, Boston Herald and Christian Science Monitor.

The program is not an easy one for either students or instructors. We caution each student they will have their fair share of misery and agony, but it should be the kind of agony and misery that they may have experienced if they were ever in love--because they should be in love with the career for which we prepare them.

INNOVATIONS IN THE MICHIGAN TECH PROGRAM

Clarence Andrews
Michigan Technological University

Michigan Tech has 5000 students, about 95% male, I might point out. We have some graduate programs, but not many; in my own area of Humanities, we have none. Our main emphases at Tech are forestry, engineering, biological sciences, and business administration.

Some years ago Professor Harley Sachs developed 6 courses at Michigan Tech to produce a technical writing major within the humanities department. These were aimed at the print media, and had to do with writing, editing, graphics, publishing, etc. That program over 5 to 7 years turned out about 2 to 4 graduates a year, all of whom we've placed without any difficulty. When I went to Tech, I learned that the tech writing program was about to be dropped because it was not attracting enough students. I have proposed a program, based on a program developed at Wichita State University, involving game-playing. The developer was Dr. Lee Thayer, who later taught at the University of Iowa.

I proposed this game-playing program a year or two ago, and out of it came our new program. It has a basic core of 98 hours which leads to an associate degree--9 hours of freshmen composition, some units of math or language, history, social science, psychology, physical education, speech, etc. These 98 hours constitute half of the 4-year degree requirement. The balance, another 98 hours, is divided between 48-50 hours in technology or science and 48-50 hours in communications skills courses. Our program is designed to produce information experts in technology or science.

We start out with introductory courses in film, magazine, radio, the print media, and TV. These courses are designed to draw large numbers of students outside the major, because we have to generate student credit hours in these courses or we don't have a program. It's as simple as that. We have a film course that drew 200 students this year. We move from the introductory courses to second-level courses in theater, art, film, advanced composition, creative writing, writing for the print media, for radio, for TV, etc. Then we move into a 9-hour senior project. This may all sound rather routine, but I want to go one step further, because I still haven't forgotten my game-playing notion. This whole business--the 48-50 hours--is going to be set up in modules. If we're going to teach people how to use the mass media, why not let them learn from the mass media? Why not let them go over to the library, take a tape cassette, and stick it into a box, push a button, and learn something about making TV films from a TV presentation? Why not let them watch a film on film-making and then come in and see the teacher on a tutorial basis? Once we get him up to the senior level, this student is going to produce something, for example, a tape for a professor in electrical engineering.

We already have students working on similar projects. For example, on this trip to Minneapolis, one student has an assignment to write about it for the local press, and 3 local radio stations. Another student has got an assignment to write about it for the Milwaukee Journal, Chicago Tribune, and the Detroit Free Press, all of which are competing for news about our area. Another one will write an article for our alumni news--we had a similar trip a year ago; the alumni news gave it a 3-page spread, and we got

inquiries from students who wanted to get in our program as a result of it. And we brought our TV equipment along. That tape will be taken back and given to these senior students and we'll say, "All right, put together a tape on magazine production from the things you shot over at Miller Publishing Company." It's all on tape, it's all on TV tape and it's also on sound tape. Put these four things together and produce a film that will teach our new people what goes on in magazine production in a general way. And that tape will become available, then, next fall, for students who are coming into our program. That's about as far as we can push internships. I have a lot of help on this self-paced program. Tech is doing a lot of it already in the engineering college. We have a number of self-paced programs going there, using audio-visual and tutorial types of things.

Our program can be based either in science or technology, but we're not interested in producing the kind of person who is only going to write instruction manuals. I have nothing against writing instruction manuals, I've written my share of them--or specifications--but we want to train the person who can become an information expert, either if he runs his own business, as some of our students will, or if he goes to work in industry.

TECHNICAL JOURNALISM AT COLORADO STATE UNIVERSITY

Bruce Linn
Colorado State University

In the interest of saving time, let me just briefly outline the CSU Technical Journalism program. It consists of 7 parts, one of which is the core of the major.

I. English -- 15 credits

Introduction to Writing

Intermediate Writing

English electives -- 9 credits

II. Language/Math -- 15 credits

15 credits in one foreign language

or

15 credits in math, statistics, and/or computer science

III. History/Political Science -- 9 credits

IV. Science -- 23 credits

3 credits in fundamental statistics

and

20 credits chosen from a list of options

V. Support Courses -- 23 credits

Chosen from Cultural Anthropology, Introduction to Business, Principles of Economics, Introduction to Geography, Elementary Logic, General Psychology, Public Speaking, and Typing

VI. Cognate Areas -- 30 credits

30 credits of electives in 1-3 related areas of the student's interest outside of journalism with a minimum of 3 courses in each area undertaken

Journalism Core -- 48 credits

There are 4 options that Technical Journalism majors may take: Broadcast News/Documentary Film Option; News-Editorial Option; Public Relations Option; and the Technical/Business Option.

All students take Reporting, Basic Photography, the Editorial Process, Communication Law, and History and Principles of Journalism.

The Technical/Business Option includes Graphics; Writing for Specialized Audiences; 10 credits of journalism electives, and 9 credits chosen from Communication Management, Basic Technical Writing, Writing in Public Relations, Advanced Technical Writing and Editing, Technical Literature, and Publication Management.

THEY ALSO SERVE WHO ONLY STAND AND WAIT

L. David Schuelke
University of Minnesota

We are all concerned with the product of science and technology. Essentially, this "product" is information--coded, charted, graphed, written, spoken, or video-taped, and disseminated. As we all know, scientific and technical information may be organized in different modes and "packaged" in numerous forms to be transmitted through various channels to multiple audiences of varying degrees of knowledge and need.

Our approach, I think, has been to examine what happens in the "real world" of science and technology, and to translate these forms and formats to our students for learning and practice. And so we have the feasibility study, proposals, progress reports, research reports, impact assessments, interpretation-of-science articles, and so on.

Our approach has been reactive. Reactive in relation to the perceived need for greater preciseness, greater specificity, improved clarity, better adaptation to audience, and, in general, better writing skills.

But my proposal today is that we have not gone far enough.

Bertita Compton, in her essay on "Scientific Communication" in the recently published Handbook of Communication (deSola Pool and Schramm, Rand McNally, 1973), points to (what she sees as) emerging problems in scientific and technical communication. Among these problems she lists the following:

1. The growing volume of scientific and technical information,

2. The increasing specialization within science and new synergistic interrelationships that continually re-shape and re-define both subject matter and audience, and

3. The increasing emergence of fields and sub-fields that have produced new and diverse user groups with varying information needs.

Ms. Compton and Professor Ronald G. Havelock of the University of Michigan both contend that the answer for the future is in RESEARCH IN SCIENTIFIC AND TECHNICAL COMMUNICATION PROCESSES, per se.

Dr. Havelock, in a paper presented at the American Association for the Advancement of Science convention held in February, 1974, in San Francisco, explained what he sees as the "need" for research in the utilization of scientific and technical information.

His major contention is that the scientific and technical community 'really doesn't care much about utilization of scientific information." Compton's review of past research in the field of scientific and technical communication supports Havelock's conclusion. And, by the way, so does an analysis of the nature and genre of scholarly articles appearing in our journals (Journal of Technical Writing and Communication and Technical Communication).

Havelock's premise (and my premise) is that we need to conduct basic research in the phenomena of scientific and technical communication.

Reviewing the research of Menzell, Rubenstein, Garvey, and others, Bertita Compton reports that past studies of scientific and technical communication have dealt principally with the following:

1. Patterns of exposure to information sources
2. Preferences for and evaluations of information sources
3. Prevalence of certain skills and practices
4. Functions of information
5. Impact of information upon performance
6. Flow of information from generator to user

I think we need to ask ourselves how much we know of these six areas of research, how much our students know (or need to know) and how we may be able to contribute to the discovery of new knowledge about the very nature of communication in scientific and technical settings.

I think the time has come to go beyond the research of Everett Rogers, Herbert Menzel, and William Garvey, and devote a substantial, continuing, and rigorous effort to extending earlier research to field applications in our own consulting, through our own research efforts, and particularly with students of scientific and technical communication.

Dr. Charles Kimball, in his report of a NASA conference held more than a decade ago, identified barriers to the transfer of scientific and technical information which seem to be as true today as they were then:

1. Many either do not want to use sources of information or do not know that they exist

2. There is a lack of rapport and consequent communication between industry and universities, thereby shutting-off a potentially rich source of new idea input

3. There is a perceivable resistance by scientists and technologists to communication of their research conclusions or to the idea that transfer can (or must) take place

4. There are not enough trained technical communicators to manage, co-ordinate, and help produce information for consumption and utilization by audiences of potential users-of-technology

If you add to these contentions the conclusion of Dr. Charles Redding of the Communication Research Center at Purdue that "communication overload" is a persistent and debilitating reality in most organizations, it would seem that we have our work "cut out for us."

Essentially, we train students in science, technology, and technical

writing. Shouldn't we begin to investigate some of the basic issues ourselves? For example, what do we know about "invisible colleges" (the cadres of scientists and technologists who exchange ideas among themselves informally); what do we know or need to know about inter-personal communication networks, person-to-person interactions, seminar exchange, planning and co-ordinating state-of-the-art or "frontier technology" conferences, literature search and retrieval methodology, and assessment of communication effectiveness?

More importantly, what do our graduates know about research in scientific and technical communication? Is their view of technical communication static or dynamic?

My hope is that our technical communicators will not only be writers, but that they will understand and appreciate all of the processes of communication, all of the forms, the arts and sciences involved with media, graphics, organizational and interpersonal communication, and research.

Hopefully, our graduates will approach ANY communication event with a research paradigm:

--What are the objectives of this communication event?

--What answers can be found through pre-audience analysis?

--What alternatives are there for message design?

--Media and channel selection?

--Most importantly, how can we measure the results of this communication? In ACTION? In BEHAVIOR? In ATTITUDE? in BEHAVIOR CHANGE? In KNOW-HOW?

--What are the results of communication?

--How can we change our messages, media, channels, to meet our objectives?

We need to practice the research approach in scientific and technical communication.

The title of this paper is an oft-quoted line of John Milton's. It brings to my mind the traditional role of the technical writer in our society. Many view the technical writer "standing and waiting" for the researcher, the "pure" scientist to make the discovery or the decision to be explained, interpreted, and transfered to a user group.

My premise is that a technical communicator, fully-armed with the art and practice of discourse, should not only serve the needs of science and technology by "standing and waiting." My intent is to help prepare the technical communicator to originate, design, and investigate the phenomena of communication in scientific and technical settings to answer the many questions that need to be solved for the transfer of technology to really occur.

Appendix 1

Location of Technical Communication Programs

Arizona State University
Boston University
California State College at Fullerton
Carnegie-Mellon University
Colorado State University
Illinois Institute of Technology
Iowa State University
Kalamazoo Valley Community College
Michigan Technological University
University of Minnesota
University of Missouri*
University of Nebraska Medical Center*
Rensselaer Polytechnic Institute
Rochester Institute of Technology*
San Diego Evening College
South Dakota State University
Spokane Community College
Technical Institute of Oklahoma State University
Texas State Technical Institute

*Medical Writing